

Claims.

1. A spatial light modulator imaging system comprising: -

5 at least one electrically addressed spatial light modulator EASLM (4, 30)

an optically addressed spatial light modulator OASLM (6, 8, 31) itself comprising a layer (21) of a nematic liquid crystal material contained between two cell walls (15, 24) provided with parallel in opposite direction alignment, the layer thickness  $d$  and  
10 the birefringence  $\Delta n$  at a wavelength  $\lambda$  approximately satisfy the equation  $\Delta n \cdot d = \lambda/4$ ;

an optical system (5, 32) for directing light from the EASLM (4, 30) onto the OASLM (6, 8, 31)

15 a controller (13, 40) for loading images on the EASLM (4, 30) then optically onto the OASLM (6, 8, 31)

a controller (13) for applying write voltages to the OASLM (6, 8, 31) simultaneously with application of addressing light (9, 33);

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a read light source (10, 12, 36) providing coherent light of one or more wavelengths for illuminating the OASLM (8, 31) to provide visible diffracted images;

the arrangement being such that a plurality of images are read into the EASLM (4, 30)  
25 and thence onto the OASLM (6, 8, 31) at a rate sufficient to present a stable holographic image to an observer (11).

2. A spatial light modulator imaging system comprising: -

at least one electrically addressed spatial light modulator EASLM (4, 30)

5 a monostable optically addressed spatial light modulator OASLM (6, 8, 31)

arranged to receive addressing light (1, 2, 33) from the EASLM (4, 30) through an optical system (5, 32)

10 a controller (13, 40) for loading images onto the EASLM (4, 30) then optically onto the OASLM (6, 8, 31)

a controller (13) for applying write voltages to the OASLM (6, 8, 31) simultaneously with application of addressing light (9, 33);

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a read light (10, 12, 38) for illuminating the OASLM (8, 31) to provide visible images;

the arrangement being such that a plurality of images are read into the EASLM (4, 30) and thence onto the OASLM (6, 8, 31) at a rate sufficient to present a stable image to

20 an observer (11).

3. The system of claim 2 wherein the read light is coherent light of one or more wavelengths.

25 4. The system of claim 2 wherein the read light is incoherent light.

5. The system of claim 2 wherein the OASLM comprises a layer of a nematic liquid crystal material.

- 6 The system of claim 2 wherein the OASLM comprises a layer of a nematic liquid crystal material arranged to give a layer retardation optimised to give maximum diffraction efficiency between switched and unswitched states.
- 5 7. The system of claim 2 wherein the OASLM comprises a layer of a nematic liquid crystal material contained between two cell walls provided with parallel in opposite direction alignment.
8. The system of claim 2 wherein the OASLM comprises a layer of a nematic liquid  
10 crystal material contained between two cell walls provided with parallel in opposite direction alignment with a surface tilt of less than  $10^\circ$ .
9. The system of claim 2 wherein the OASLM comprises a layer of a nematic liquid crystal material contained between two cell walls provided with parallel in opposite  
15 direction alignment, the layer thickness  $d$  and the birefringence  $\Delta n$  at a wavelength  $\lambda$  approximately satisfy the equation  $\Delta n \cdot d = \lambda/4$ .
10. The system of claim 2 wherein the EASLM is a single EASLM whose output is arranged to be scanned sequentially over different areas of the OASLM.  
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11. The system of claim 2 wherein the OASLM is a single OASLM having a plurality of segments arranged to be addressed in a sequence by light from the EASLM.
12. The system of claim 2 wherein the OASLM is formed by a plurality of single  
25 OASLMs arranged to be addressed in a sequence by light from the EASLM.
13. The system of claim 2 wherein the controller contains computer generated holographic images for providing a diffraction pattern to be loaded into the EASLM (4) and displayed to an observer as a three dimensional image.

14. The system of claim 2 wherein the EASLM (30) is an m by n array of separately addressable EASLMs and the OASLM (31) is an m by n array of segments or separate OASLMs.
- 5 15. The system of claim 2 wherein the OASLM contains a layer of nematic liquid crystal material arranged in a twisted configuration (90°, 180°, 270°, 360° of twist).